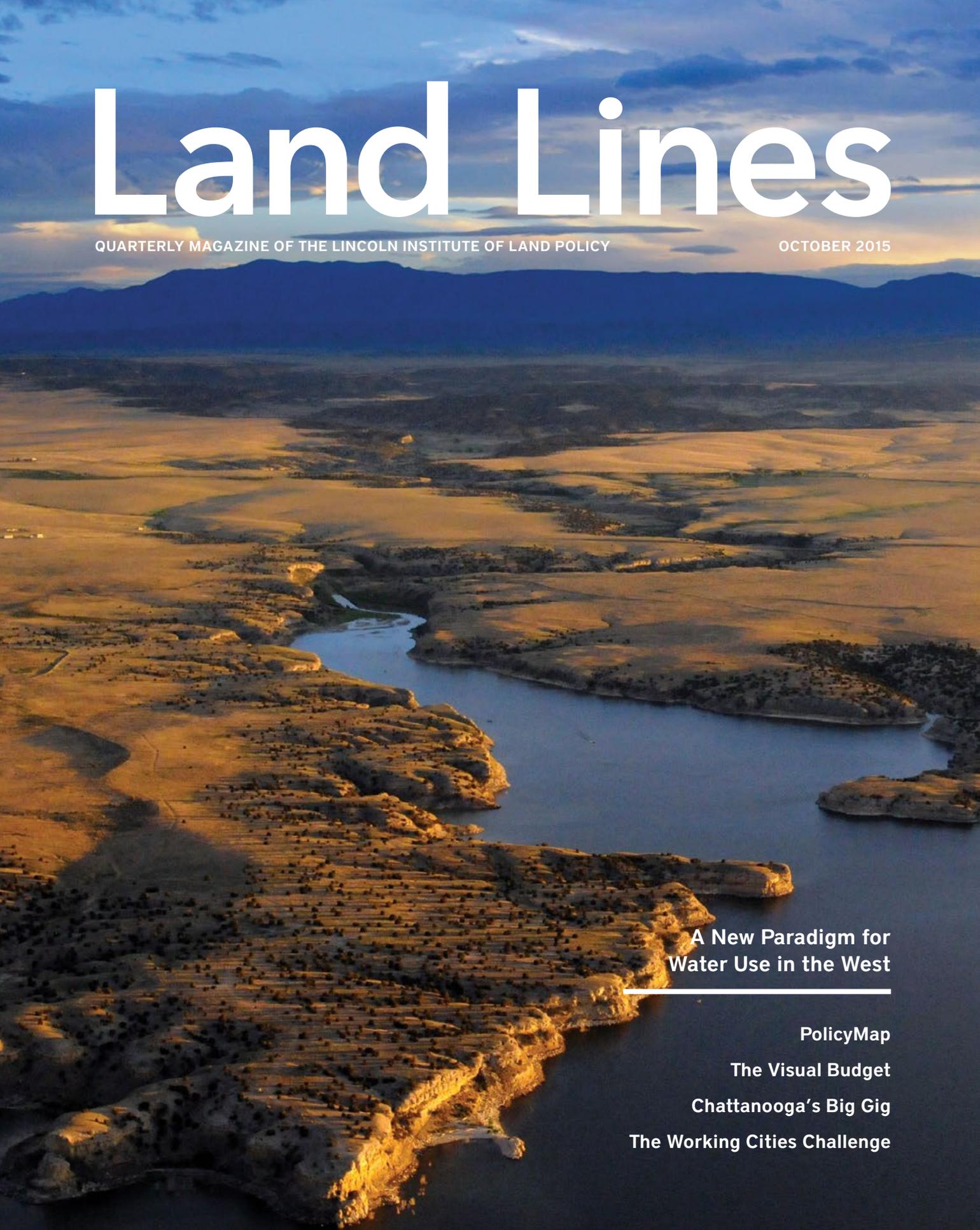


Land Lines

An aerial photograph of a wide river valley at sunset. The sun is low on the horizon, casting a golden glow over the landscape. The river flows through the center of the valley, surrounded by rolling hills and fields. In the background, a range of mountains is visible under a blue and orange sky.

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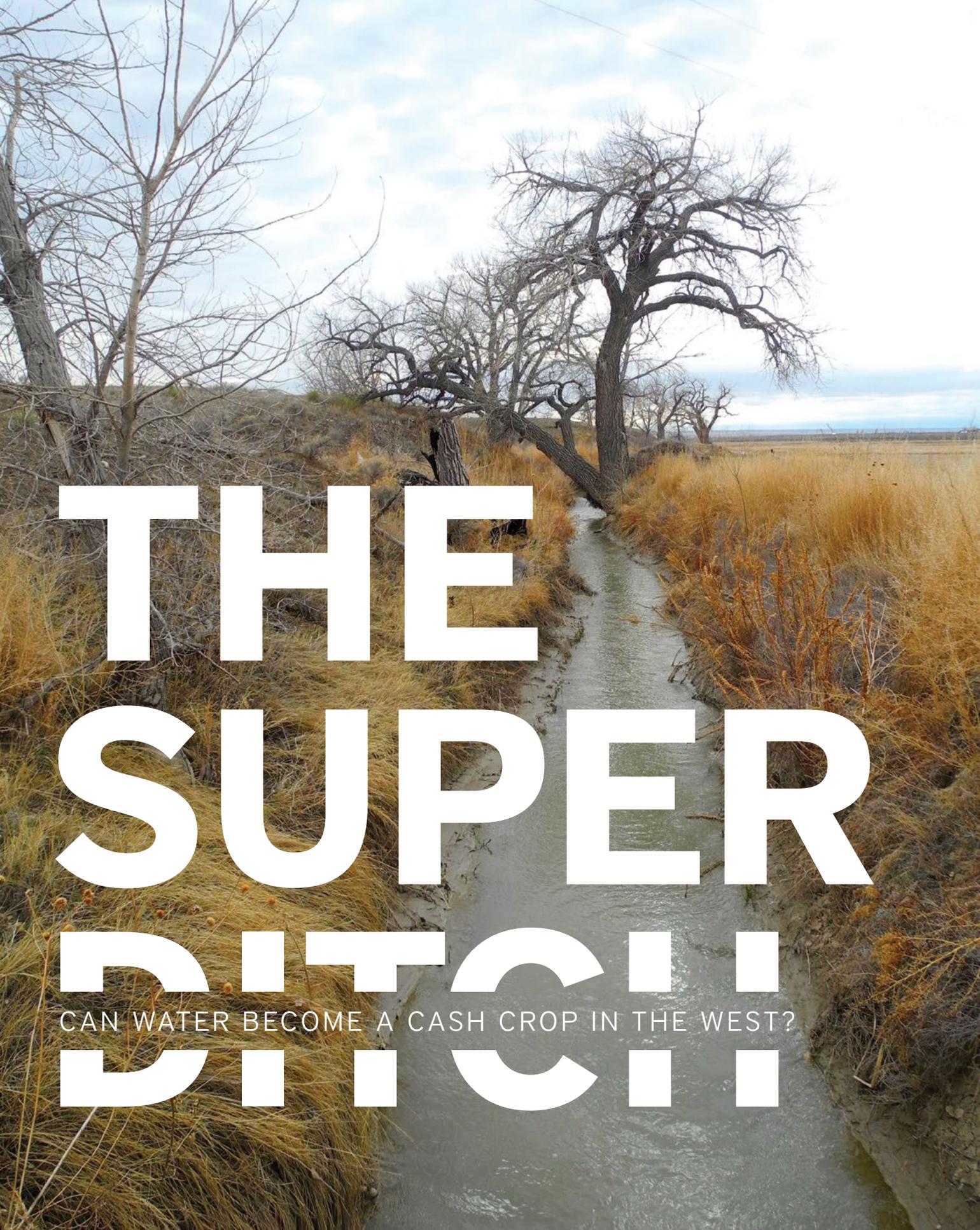
**A New Paradigm for
Water Use in the West**

PolicyMap

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Chattanooga's Big Gig

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THE SUPER DITCH

CAN WATER BECOME A CASH CROP IN THE WEST?

By Scott Campbell

PETER NICHOLS IS AN AVID OUTDOORSMAN AND ONE OF COLORADO'S LEADING WATER LAW ATTORNEYS. It's not uncommon to see him enter the lobby of his Boulder office at Berg Hill Greenleaf & Ruscitti—a room with stone, hardwoods, and a sharp-dressed receptionist—in wrinkled attorney attire and a pair of worn river sandals. By his own reckoning, being a water law attorney is his sixth career. "Ski bum was my first," he says. Then came a job with the Colorado General Assembly, positions helping western communities deal with rapid energy development, and water rights consulting work with energy companies themselves. In 2001, Nichols returned to the University of Colorado, where he received his M.P.A. in 1982, to earn his J.D., with a focus on water law. He has been setting precedents in Colorado watersheds ever since.

One of his proudest accomplishments, he says, was a 2013 Colorado Supreme Court case that affirmed the prerogative of conservation groups to encumber water rights in conservation easements, to address ecological and supply problems in Colorado's rivers. So was giving a presentation that inspired the Colorado Interbasin Compact Committee, which oversees development of the Colorado Water Plan—a historic blueprint for collaborative, statewide water management in the face of rapid population growth. But of all his accomplishments, his work in Colorado's Arkansas River Basin is the most important, he says. It's "the crucible" for how the West is going to handle the severe water shortages projected across the rapidly growing Rocky Mountain region.

"The problem began here," he says, "and if we're going to solve it, we're going to have to solve it here." The problem he is referring to is an urban water acquisition trend known as buy-and-dry.

One-third of historically irrigated farmland is now dry in Colorado's Lower Arkansas River Valley, where agriculture depends on ditches like this one in Pueblo County. Credit: Sofia Viguri

Colorado's Arkansas River Basin is "the crucible" for how the West is going to handle the severe water shortages projected across the rapidly growing Rocky Mountain region.

In a buy-and-dry acquisition, a municipal water utility will meet a city's growing demand for water by purchasing interests in irrigated agricultural land, permanently following that land, and diverting its water into the taps of city residents. On Colorado's Arkansas River—where no water is available for new uses and there is a constant call for additional supplies—buy-and-dry tactics have diminished farmland across the basin. In the Lower Arkansas Valley, where the Arkansas River courses through Colorado's eastern prairie, agricultural communities in some counties have been absolutely devastated.

Nichols says, "the Colorado Water Plan is very focused on eliminating buy-and-dry." The question is how to do it. "We can't stop cities from getting the water they need, but maybe we can change the rules [of the game], so it's not a free-for-all."

The most promising game changer, he believes, is the Super Ditch.

Launch of the Super Ditch

West of the 100th meridian, where supplemental irrigation is required to grow food, irrigation ditches are a common means of delivering water from a river, lake, or reservoir to users along its course. In the Lower Arkansas Valley, there are approximately 20 major mutual irrigation ditch systems. The Super Ditch, however, is not a real ditch. Rather, it's a corporation—the Lower Arkansas Valley Super Ditch Company, Inc.—set up to provide leased agricultural water to cities as an alternative to the buy-and-dry trend. It represents seven ditch companies operating eight ditches between two reservoirs, the Pueblo and the John Martin.

The Super Ditch began leasing water for the first time this year, through a small pilot project. But it was incorporated in 2008, with the assistance of the Lower Arkansas Valley Water Conservancy District (LAVWCD), a special district established by voters in 2002. Those who voted for the district, whether they owned water or not, were tired of seeing what they considered “their river” diverted to cities more than 100 miles away—some of which lay in completely different river basins. Even urban voters in the City of Pueblo, a steel town on the Arkansas River (population 108,000), sided with rural farmers in the face of economic hardships. “Not one more drop!” became a rallying cry against water leaving the valley.

Nichols serves as special counsel to the LAVWCD and helped the district develop the Super Ditch concept. Inspiration came from California, where the Palo Verde Irrigation District launched a long-term fallowing-leasing

program with the Metropolitan Water District of Southern California (MWD) in 2005. The contract between the two entities seeks to supply 27 southern California coastal communities, including San Diego and Los Angeles, with 3.63 million acre-feet of Colorado River water from one ditch over a 35-year period. Participating farmers stop irrigating for a designated period of time, fallow their fields, and receive payment for their water, which bypasses their farms on its journey to MWD customers.

The LAVWCD sought to create a similar project, predicated on a rotational fallowing-leasing concept, but the Super Ditch was a much more sophisticated undertaking. Facilitating work with seven different mutual ditch companies, each with its own board and governance structure, was fraught with challenges. The cumbersome nature of Colorado water law, and the powerful market mechanisms and path dependencies that guide urban water acquisition

strategies in the state complicated matters further. Colorado municipalities are hesitant to rely on water leasing, and for good reason. Certainty of supply is critical, and the temporary nature of leasing versus the permanent nature of ownership is unsettling to most urban water providers. What happens if the population grows by 50,000 people, and the leased water those people are relying upon is no longer available—or is sold to a competing water provider?

Nichols tried to develop the Super Ditch concept in ways that addressed these concerns. Supplies from different farmers are pooled by the Super Ditch, and provided to cities under long-term lease contracts. To guarantee that leased supplies are available once the lease period ends, the LAVWCD began working with farmers to place conservation easements on participating farms—protecting them from development and tying the water to the land in perpetuity to ensure future production potential. While enabling temporary transfers, the easements eliminate the possibility of any permanent water severance, diversion, or change in use. In other words: no buy-and-dry.

Conservation easements have protected the fabric of agricultural communities across Colorado and around the nation. An easement-protected land base creates assurances that the future production potential of an agricultural community will be maintained in the face of land conversion threats stemming from urban sprawl, oil and gas development, or municipal buy-and-dry. With the land base protected, related agricultural industries are able to invest in the region with confidence. That, in turn, has a net positive impact on Main Street.

In May 2015, the Super Ditch delivered its first water supplies: five farms on the Catlin Canal provided 500 acre-feet of water to the city of Fountain (pop 27,000), the city of Security (pop 18,000), and the town of Fowler (pop 1,200). Fountain Water Resource Engineer Michael Fink says, “the city took delivery without a hitch,” adding that the long-term success of the program depends on ensuring that the Super Ditch doesn’t advance a supply-side economic model.

By following one-third of their fields three out of every ten years, farmers “rest” 100 percent of their land once in a ten-year period—a process that supports recommended practices in crop rotation and soil management, while allowing water itself to become a cash crop.

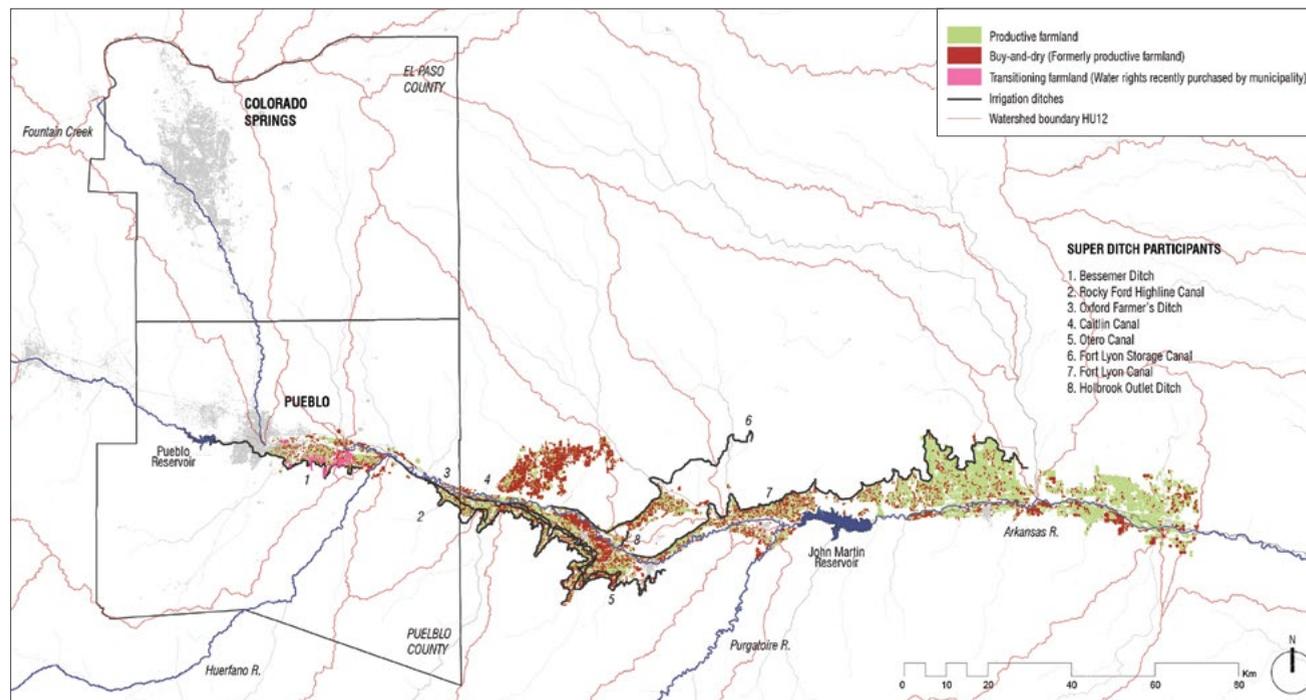
Nichols says that’s not a problem. “Cities can lease [from farmers] three in 10 years or 30 percent of the time. They have the responsibility to let farmers know in advance [when they will be leasing]. But for the most part, cities don’t need water in dry years, they need it the year after to refill storage [reservoirs].”

By following one-third of their fields three out of every ten years, farmers “rest” 100 percent of their land once in a ten-year period—a process that supports recommended practices in crop rotation and soil management, while allowing water itself to become a cash crop. Nichols reports that with three-out-of-ten-year crop rotation, a demand of 25,000 acre-feet of water can be met by involving 40 percent of the irrigators. Some farmers believe that as many as 80 percent will want to participate. Participants will certainly be needed: the supply gap in the Arkansas River Basin is projected to grow to 88,000 acre-feet or more by 2050. The litmus test for success will be if large cities responsible for the majority of buy-and-dry activity—Aurora (population 346,000) and Colorado Springs (population 440,000)—sign on to the program. “Municipal acceptance of leasing rather than buying,” Nichols says, “remains the principle challenge.”

From Pioneer to Buy-and-Dry

In the Lower Arkansas Valley, water has divided communities for much of the 20th century. In the 19th century, it divided entire nations. The river here delineated three international boundaries over time: between Spain and the United States following the Adams-Onís Treaty of 1819, which codified the border of the Louisiana Purchase

IRRIGATED FARMLAND IN THE LOWER ARKANSAS VALLEY



Growing cities have purchased an immense number of irrigated farms in the Lower Arkansas Valley and appropriated their water for municipal purposes. Credit: Sourav Biswas and Flavio Sciaraffia

An acre-foot will cover one acre with one foot (325,851 gallons) of water. One acre-foot will typically serve two Colorado households per year (four if they don't have lawns to water).

between the two countries; between Mexico and the United States following Mexican independence from Spain in 1821; and between the Republic of Texas and the U.S. before Texas's annexation in 1845. Two years after the Adams-Onís Treaty was signed, the Santa Fe Trail was established along the river's course, bringing traders, soldiers, miners, and settlers into Colorado. Those pioneers developed some of Colorado's earliest settlements—and, with them, water diversion projects along the river's banks.

The West is dry, and even though the Arkansas River is the Mississippi River's second longest tributary, it carries very little water in Colorado. Consider how quickly waters in the Lower Arkansas Valley were appropriated. Following the earliest appropriation in 1861, the Homestead Act of 1862 was enacted. More water rights were developed with settlement. By 1874, the last water rights decree still in priority 100 percent of the time (meaning there is always enough water in the river to serve it) was

established—two years before Colorado gained statehood in 1876.

Water rights that were appropriated in 1887 are in priority less than 50 percent of the time today. Water rights from 1896 are in priority less than 10 percent of the time. This means that a modern farmer in the Arkansas Valley with an 1896 water right established by his great-grandfather will be able to irrigate just 10 percent of the time given average precipitation. The rest of the time, when there is a “call on the river”—meaning there is not enough water in the system to serve all rights holders—he must desist from diverting water to his fields, so that more senior water-rights holders can use it.

With the Arkansas River overappropriated before the turn of the century, cities began purchasing water from farmers as early as the 1890s. But shortages or conflicts were also addressed through the development of trans-basin diversion projects (which moved water from other river basins into the Arkansas) or storage projects (which sought to capture surplus water behind dams during high flow periods). These projects reached their thresholds in the 1970s. It was then that cities began seriously looking to irrigated lands.

During the 1970s and '80s, Colorado Springs and Aurora, working with corporate landholders and the City of Pueblo, acquired interests in 55,000 acres of farmland served by the Crowley Canal. The cities subsequently diverted nearly 70,000 acre-feet of water for municipal use, drying up the vast majority of Crowley County. Crowley became the buy-and-dry poster child, and continues to hold that undistinguished title today. Poverty rates exceed 35 percent. Main streets are shadows of the communities that existed there in the mid-20th century. Noxious weed infestation and dust storms are common on dried-up lands. Restoring these farms to native prairie is not only expensive but, in practice, ranges from difficult to impossible.

Today, the losses of irrigated agriculture from water sales in the Lower Arkansas Valley exceed 100,000 acres, representing more than 150,000 acre-feet of water annually. Some farms continue operations by temporarily leasing land or water

The Catlin Canal, a large mutual irrigation ditch in the Lower Arkansas Valley, is providing leased water supplies to cities as an alternative to the buy-and-dry trend. Credit: Scott Campbell

from the cities they sold to, but those leases will soon expire, advancing even greater losses. In a region that historically irrigated 320,000 acres of farmland, one-third of the tilled ground is now dry, few if any economically viable land use alternatives exist, and people are wondering if a tipping point is coming that will mark the collapse of irrigated agriculture in the area.

“As in much of the West, agriculture is at the heart of this region's cultural heritage,” says Summer Waters, director of Western Lands and Communities, a joint program of the Sonoran Institute and Lincoln Institute of Land Policy. “However, we have entered an era in which cities are becoming part of our legacy too. This leaves us with a question that we have to answer collectively: what will the new West look like?”

“Ideally, both cities and agricultural areas will be able to co-exist in the new West,” Waters says. “The key to striking that balance lies in how we manage our water supplies. The Super Ditch concept is an innovative way to build flexibility into our water systems, and flexibility is critical in times when supply is uncertain.”

A Promising Pepper in an Unpromising Place

Mike Bartolo is visibly frustrated. He worries that water transfers will displace agriculture. “We're losing some of the best growing land in the state,” he says. “These are prime soils that don't exist in other places. How do you create certainty in the industry [when this is going on]? That's the question.”

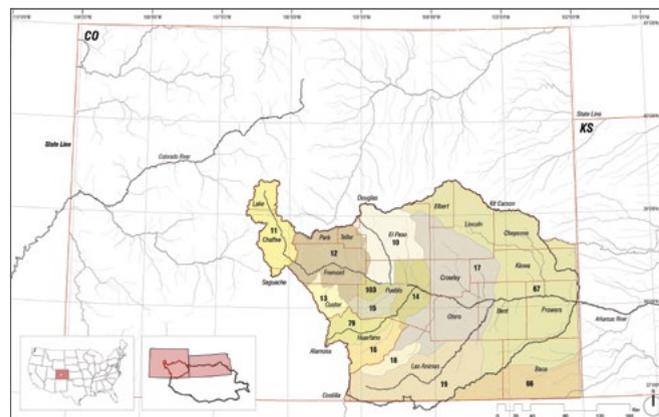
Bartolo, who holds a Ph.D. in plant physiology from the University of Minnesota, is a member of the water faculty at Colorado State University (CSU) and a senior research scientist at CSU's Arkansas Valley Research Center. He sits on the Super Ditch board of directors, representing the Bessemer Ditch (one of the eight participating



ditches), where he is a shareholder. With an 1861 water right, the Bessemer provides one of the most senior and reliable sources of water to farms anywhere in the Lower Arkansas Valley, and it irrigates some of the valley's best lands. Bartolo is still grieving the 2009 loss of 28 percent of the water in the ditch—sold by farmers he knows to the Pueblo Board of Water Works (PBWW), the utility that provides municipal water to the City of Pueblo.

According to Nichols, there have been occasions when cities strategically approached farmers during the worst of times—when some combination of recession, drought, low commodity prices, overleveraging, or other factors forced their hand. But it is equally true that retiring farmers have assembled collectives to negotiate bulk water sales to cities. The Bessemer Ditch shareholders who sold 5,540 shares to PBWW for \$10,150 per share (a share of Bessemer ditch water irrigates approximately one acre) were largely retiring farmers without heirs, responding to falling commodity prices and looking to capitalize on the increasing value of water following the severe drought of 2002. The eventual sale in 2009 netted them more than \$56

THE ARKANSAS RIVER BASIN



The Arkansas River Basin is Colorado's largest, spanning nearly a quarter of the state, but it carries the least amount of water—just 6 percent of the state's total supply. Supply issues on the Arkansas River could be a harbinger of what's to come in other Western environs. Credit: Sourav Biswas and Flavio Sciaraffia



Farmers recently sold 28 percent of the shares in the Bessemer Ditch, which irrigates this farmland east of the City of Pueblo, to the Pueblo Board of Water Works, for municipal use. Credit: John Wark/Airphoto NA

million. Consider that dry land in this region often sells for less than \$300 per acre, and you get a sense of where land values lie: in the water. Wanting to protect other producers and the agricultural fabric of the communities served by the Bessemer, Bartolo tried to convince farmers not to sell—to no avail. “I said, ‘let’s look at other options, at conservation easements, at the Super Ditch,’ but you have to realize how long these sellers had been working on this. Even if they were open to alternatives, my ideas were pie in the sky compared to the cash offer they had in hand.” (The Super Ditch was established but not operational at that time.)

Growers in the region have a great deal of respect for Bartolo. He’s a fourth-generation farmer, credited with developing the Mosco variety of Mirasol green chile pepper—the most popular variety of green chile grown locally and

a centerpiece at the Pueblo Chile & Frijoles Festival, which draws more than 100,000 Coloradans each year. Whole Foods recently decided to stock stores with Mosco chiles from the Arkansas Valley rather than Hatch chiles from New Mexico—a blow to the pride of New Mexicans, whose state vegetable is the chile pepper.

Bartolo developed the Mosco chile from seeds his father gathered at the home of Mike’s uncle, Harry Mosco, following his death in 1988. Mike planted the seeds. “One plant I grew was different,” he says. “It had better yield, bigger fruit, and meatier flesh, which made it easier to roast.” Mike made single plant selections beginning with that plant. He isolated the characteristics he wanted and repeated the process, developing the chile over a fifteen-year period.

Many celebrated produce items come out of the Lower Arkansas Valley, Rocky Ford cantaloupes and Mosco chiles being principle among them. Mike has grown them all. Still, when it comes to changing the playing field, as the Super Ditch is looking to do, Mike concedes

there is a lot of work ahead. “It has become politically incorrect for cities to buy-and-dry, but that hasn’t stopped other speculators [from playing the role municipal water utilities were playing].” Earlier this year, Pure Cycle, a water and wastewater services company that leases 14,600 acres of land on the Fort Lyon Canal to tenant farmers, sold the farms to an affiliate of C&A Companies and Resource Land Holdings, LLC. C&A is a company with plans to provide Arkansas River water to Front Range cities to the north. “These alternative transfer mechanisms have to be really well defined, and they have to have a history behind them to be able to compete,” Bartolo says. They need to be, he adds, just as adept and quick at providing cash in hand as an outright water sale.

Water as Cash Crop

The value of water out West is only increasing. In the Lower Arkansas Valley, a lot of wealth is embedded in the water farmers own. It seems ironic that communities in possession of such a valuable asset are confronted with poverty and decline. More puzzling still is the fact that farmers are liquidating an asset whose value only continues to grow. Ask any investment advisor, “Would you dispose of an asset predicted to continue increasing in value?” and he or she is likely to say “no . . . unless I had no other choice, or unless there was no other way to see returns from that asset.”

When it comes to water, the problem right now is that there is a strict dichotomy of choices. Farmers who own it have limited means to earn money from it except by: (1) growing food with it and planning for returns based on commodities prices, or (2) selling it and cashing out on its current value. Part of the reason choices are limited has to do with the cumbersome nature of Colorado water law. A lease of water from farm to city can necessitate a change-of-use case in the water courts. A change case involves engineering studies and legal expertise and can run tens of thousands of dollars. The change case proponent must demonstrate to the courts that third-party water rights holders, such as downstream

farmers who rely on the same ditch, will not be harmed. If the courts or third parties challenge that premise, the cost of the change case can escalate into the hundreds of thousands of dollars. Going through this process for a temporary lease, coupled with cities’ desires to guarantee permanency of supply in the face of growth, is another factor that has historically limited water leasing.

Consider that dry land in this region often sells for less than \$300 per acre, and you get a sense of where land values lie: in the water.

The Super Ditch, through legislation advanced by Nichols in 2013, enabled these checks and balances to take place through a much more efficient administrative process overseen by the Colorado Water Conservation Board (CWCB). Now, Bartolo and Nichols hope to see what happens when farmers have more than two choices. Their belief is that if farmers can retain water ownership, grow food, and realize earnings from “commodity water” at the same time—as they would from other types of assets—the economic outlook for the Lower Arkansas Valley will change.

This outlook is borne out by economic studies. As the Super Ditch concept was gaining steam in 2007, CH2M Hill agricultural economist George Oamek compared different options for farmers: sell water, continue to farm, or continue to farm while participating in a rotational fallowing-leasing program. His projections indicated that, over a 40-year horizon, farmers who sold their water would earn more than farmers who continued to farm, but farmers who continued to farm and participated in the fallowing-leasing program stood to gain the most of all. In a comment to the *Pueblo Chieftain* following the study, Oamek said that the Super Ditch could ensure the best price for farmers: “In economics, you look at collaboration as a way to draw out a higher price.”

For the same reason, however, the fallowing-leasing concept is a tough sell to large cities. **CONTINUED ON P. 33**

its reputation as one of China's premier research and training institutions on urban development and land policy issues. The center supports a number of activities, including research, training, academic exchange, policy dialogue, research fellowship, demonstration projects, and publication. We focus on five core themes—property taxation and municipal finance, land policy, urban housing, urban development and planning, and urban environment and conservation. Over the last few years, our research projects have touched upon land-based finance, local debts, housing prices, infrastructure capital investment and finance, and other topics relevant to municipal fiscal health. We have also provided training to Chinese government agencies on the international experiences of property tax assessment and administration. I would say that our work is highly relevant to the current reform.

Implementation of the new comprehensive policy reforms is generating considerable demand for international knowledge and policy advice in the China Program's focus areas, especially property taxation and municipal finance. We plan to initiate a pilot demonstration project with one or two selected cities in China, to support the institutional capacity required for the development of long-term municipal fiscal health. Our team has started a study to develop a set of indicators to measure municipal fiscal health for Chinese cities. It is the right time for us to initiate this agenda in China. □

The Super Ditch

CONTINUED FROM P. 17

Following Oamek's principle of collaboration, cities have been working together to acquire agricultural water supplies at low prices. City skepticism is heightened by inflationary concerns. If water cost is only going to increase, why not purchase supplies now, while prices are low, in order to keep utility rates down?

To address this matter, Nichols looked at different mechanisms for establishing price escalators that would protect buyers and sellers, including:

1. a market-based escalator, based upon other water conveyances;
2. an escalator based upon average municipal water impact fee increases over time;
3. an escalator based upon average municipal water rate increases over time; and
4. a cost-based escalator, as measured by the Consumer Price Index (CPI) and the Producer Price Index (PPI).

The pilot project with Fountain, Security, and Fowler guarantees pricing stability by adjusting the lease price every five years according to the percent change in the Colorado Municipal League's Index of Colorado Utility Costs.

At \$500 an acre-foot, the current Super Ditch lease will earn the five participating farmers a quarter of a million dollars this year in addition to the revenues they will earn from crop production on non-fallowed lands. Some of these crops, such as forage, are low-value crops, and the water lease provides good income in lieu of growing them. Others, like melons and chiles, are high-value crops. Bartolo is excited about the retention of these

agricultural revenues, which he thinks will create a ripple effect across the valley's many communities: "Two acre-feet of water grows an acre of chile—that's 1,000 bushels," he says, "which brings in \$10,000 to \$15,000 in revenue at the farm gate level."

Although municipal water prices are increasing, considering the shortages the West faces, they're still low by most counts. Cities have sought to keep prices low by acquiring as much water as they can, as early as they can, while keeping within the bounds of Colorado's anti-speculation doctrine.

By blurring the lines around the "types" of water that drive prices—both at the tap (utilities prices) and at the head gate (commodities prices)—the Super Ditch may launch a disruptive innovation that could alter the price of water in ways that better reflect Western realities. If farmers retain control of water and lease to cities, prices will adjust according to increasing demand in a field of diversified ownership. That's a new type of competition in the market, and that's not a bad thing. Urban growth won't have to correspond with rural decline. And a glass of water will still be the cheapest beverage to wash down a plate of locally grown chile rellenos. □

Scott Campbell is an award-winning conservation planner and consultant whose assembles diverse teams to solve complex environmental, social, and economic problems. Scott was the 2015 Lincoln Loeb Fellow at Harvard University's Graduate School of Design and a joint fellow at the Lincoln Institute of Land Policy. Prior to his fellowship, Scott directed one of the country's largest land trusts, the William J. Palmer Parks Foundation.